Peter Harrison, Ronald L. Numbers, and Michael H. Shank (eds), Wrestling with Nature: From Omens to Science (Chicago and London: University of Chicago Press, 2011)

Carolina, Georgia, Florida, and the Bahama Islands (1754) illustrates the work of plant collectors who introduced new specimens into England. The *Nicotiana* from Jane Webb Loudon's *Ladies' Companion to the Flower Garden* (1840) was a genus grown for utility as tobacco but also widely cultivated as a Victorian garden flower during decades when botanical and horticultural knowledge and practices flourished for many different audiences.

Readers of *Planting Paradise* will be impressed by the historical role of institutions such as the Bodleian and the Oxford Botanic Garden in developing and fostering knowledge of plants. Primary materials that have emerged there and elsewhere can further elucidate the story of plants in culture and society. Robert Morison, named Professor of Botany at Oxford in 1669, worked for years on a catalogue of plants in the Oxford Botanic Garden; it is replete with engravings that showed, for example, the diversity of cabbages at that time. The original copper plates for Morison's *Historia Plantarum Universalis Oxoniensis* (1680–1699) are conserved and available for study, having been "discovered being used as lift counterweights in the Bodleian Library" (Figure 28).

ANN SHTEIR

Peter Harrison; Ronald L. Numbers; Michael H. Shank (Editors). *Wrestling with Nature: From Omens to Science*. x + 440 pp., illus., bibl., index. Chicago/London: University of Chicago Press, 2011. $95 (cloth).

The first seven chapters of this book and the last seven look as if they belong to separate projects—as though the editors originally planned two books but ended up putting what they had commissioned into just one. The first half of the book offers seven survey articles on "natural knowledge" in different historical periods. It begins with a survey of "Natural Knowledge in Ancient Mesopotamia" (by Francesca Rochberg), moves on to "Natural Knowledge in the Classical World" (Daryn Lehoux), and then offers two essays on natural knowledge in the Middle Ages—the first on the Arabic Middle Ages (Jon McGinnis) and the second on the Latin Middle Ages (Michael H. Shank). Natural knowledge in the Renaissance and early modern periods has to be covered over three chapters, each one dealing with a separate major aspect: "Natural History" (Peter Harrison), "Mixed Mathematics" (Peter Dear), and "Natural Philosophy" (John L. Heilbron). The reader might have expected to go on from here to survey articles covering natural knowledge in the Enlightenment, the nineteenth century, and the twentieth century. But the editors perhaps realized that they would have to divide these later periods over an increasingly unwieldy number of chapters: chemistry and geology, for example, as well as natural history, to say nothing of mechanics, electricity, and so forth.

Instead, the editors changed tack. Chapters 8–14 offer surveys of a different kind. Each of these is concerned with ways in which "science," if I may be allowed to hypostatize for a moment, drew boundaries around its territory or separated itself from other ways of understanding or manipulating the natural world. So, our headings are now "Science and Medicine" (Ronald L. Numbers), "Science and Technology" (Ronald R. Kline), "Science and Religion" (Jon H. Roberts), "Science, Pseudoscience, and Science Falsely So-Called" (Numbers again, with Daniel P. Thurs), along with one piece that might have been called "Science and Philosophy" but is in fact entitled "Scientific Methods" (Thurs again). These are supplemented by two slightly different but no less useful surveys: Bernard Lightman on "Science and the Public" and David N. Livingstone on "Science and Place." It seems fair to say that the main chronological focus of these surveys in the second half of the book is the nineteenth century. Natural philosophy (admittedly not exactly science) and medicine had been seen as "sisters" since the time of Galen (second century A.D.), and so Numbers might have spent longer than four of his seventeen pages covering the period before the nineteenth century. Similarly, there is much to be said about premodern concerns with the relations between natural philosophy and how artificial machines exploit natural effects, but Kline begins his survey of "boundary work" between pure and applied science in the late nineteenth century.

In spite of this odd arrangement, however, *Wrestling with Nature* remains an excellent and highly useful book. Each of the articles would prove highly useful on student reading lists—and even more advanced historians, seeking to familiarize themselves with an unfamiliar period or topic, will benefit greatly from them. For me, Rochberg's introduction to natural knowledge in ancient Mesopotamia seemed to take too much for granted (but this might simply have been because my ignorance of this period is truly abysmal). She makes it clear that Babylonian astronomers observed the positions of the planets in relation to the zodiac, but there is no discussion of whether they therefore had a picture of the structure of the cosmos. Presumably they knew that an eclipse of the

moon was due to the physical arrangement of the sun, the moon, and the earth (or did they?), so did they conceive of the other planets as having an arrangement in space of the same kind? Rochberg does not tell us. Moreover, it is only Rochberg's article that represents the "omens" mentioned in the book's subtitle. "Science, Pseudoscience, and Science Falsely So-Called" might have included a discussion of science and the occult from ancient Greece to the Renaissance, but because it is in the second half of the book it begins with the late nineteenth century. But again, I find myself sounding too negative. The surveys of natural knowledge from ancient Greece to the early modern period are of a uniformly high standard and, as noted, deserve to become familiar items on student reading lists. This is true not just of those, such as McGinnis's article on natural knowledge in medieval Islam or Harrison's on natural history, that have few alternatives to compete with them, but also of those like Shank's on the Latin Middle Ages or Dear's on mixed mathematics, which supersede what has been said in earlier survey articles. Similarly, the essays in the second half of the volume should have a valued place in pedagogy: by showing how historical thinkers differentiated themselves from other thinkers, and why, we can learn a great deal about the historical development of modern science. The editors are to be congratulated for bringing together such a high-quality set (or two high-quality sets) of survey articles.

JOHN HENRY

Christoph Hoffmann (Editor). *Daten sichern: Schreiben und Zeichnen als Verfahren der Aufzeichnung*. (Wissen im Entwurf, 1.) 201 pp., illus., index. Zurich: Diaphanes, 2008. €24.90 (paper).

Barbara Wittmann (Editor). *Spuren erzeugen: Zeichnen und Schreiben als Verfahren der Selbstaufzeichnung*. (Wissen im Entwurf, 2.) 198 pp., illus., bibl., index. Zurich: Diaphanes, 2009. €24.90 (paper).

Karin Krauthausen; Omar W. Nasim (Editors). *Notieren, Skizzieren: Schreiben und Zeichnen als Verfahren des Entwurfs*. (Wissen im Entwurf, 3.) 208 pp., illus., bibl., index. Zurich: Diaphanes, 2010. €24.90 (paper).

Over the last couple of decades, history of science has advanced a great deal by investigating the minute interplay between knowledge and the tools employed in its generation. In particular, the laboratory has been studied intensively as the space of a carefully orchestrated articulation of all kinds of human and nonhuman actors, instruments, technologies, and practices. With this move toward microhistories of scientific practices, the scope of analysis has also widened, by questioning the emergence and transformation of disciplinary boundaries, by investigating the relations between science and other knowledge-related practices such as art or literature, or by focusing on the circulation of knowledge inside and outside of scientific arenas. The volumes from the series under review, the product of a collaborative research project at the Max Planck Institute for History of Science in Berlin and the Max Planck Society's Institute for Art History in Florence, take this double move one step further by suggesting the investigation of notational practices such as writing, sketching, and drafting as the most mundane but still knowledge-centered practices—the transdisciplinary infrastructure of knowledge in the making. Christoph Hoffmann, one of the two directors of the research project and now a professor of science studies in Lucerne, opens the series with a superb outline of the research agenda: Writing and drawing do not operate as specific methods or technologies but as more formal procedures, guiding the coming into being of epistemic things as habituated routines, temporal structures, or organizational arrangements. Such rules are certainly at the disposal of the actors, and a good deal of training goes into their successful application; the results they yield, however, escape any intentionality—which exactly describes their epistemic dimension.

Daten sichern: Schreiben und Zeichnen als Verfahren der Aufzeichnung, Volume 1 of this four-volume set (Vol. 4, *Welten schaffen: Zeichnen und Schreiben als Verfahren der Konstruktion*, is not yet available), pursues the project's agenda in impressive breadth, with examples ranging from astronomical and biological drawings to philosophical manuscripts, art historical notes, and outlines for literary works; but its results remain somewhat ambivalent. Omar Nasim, for example, gives a wonderfully detailed account of the sophisticated arrangements in Lord Rosse's team for the drawing of stellar nebulae with the help of the "monster of Parsonstown," a gigantic telescope. The essay, however, does not fully succeed in convincing the reader of the historiographical significance of its analysis. Perhaps Nasim felt similarly; in any case, he has contributed a more powerful essay to the third volume, where he describes how such drawing practices turned a well-known, though opaque, astronomical entity in